Maine CDC
Maximum Exposure Guidelines (MEGs) 2010 Update

July 2010

Environmental and Occupational Health Program
Center for Disease Control and Prevention

Maximum Exposure Guideline 2010 Update

This update summarizes changes to the Maximum Exposure Guidelines (MEGs) associated with the July 2010 update. This update is organized into three section based on the type of change to the MEG that occurred: (1) changes to existing MEGs due to updates to the toxicity value that serve as the basis for the MEG; (2) removal of compounds from the MEG list due to a lack of current toxicity information; and (3) changes due to the addition of compounds to the MEG list. A table accompanies the update and provides a quick-view format for the MEG changes. In addition, note that MEGs for a number of compounds appear to be different, but have only been rounded to represent the MEG to one significant figure. These compounds are footnoted on the 2010 MEG table.

<u>MEG Changes Due to a Toxicity Value Change</u>

MEGs have changed for 52 compounds because the toxicity value that served as the basis for the MEG has been revised or the basis has changed since the last MEG update. The compounds and the rationale for the change in MEG value is provided in the following bullets:

- Aluminum: The previous MEG was based on a default value of 1430 ppb based on a BOH 1984 value (derivation unknown). The 2010 MEG of 7000 ppb was derived using standard methodology and is based on the September 2008 ATSDR chronic MRL (2000 study) in which mice were fed aluminum from conception through 24 months of age and displayed decreased grip strength and increased thermal sensitivity.
- Barium: The previous MEG of 2000 ppb was based on the 1998 IRIS RfD. In July 2005, a revised RfD was posted on IRIS. The 2010 MEG of 1000 ppb was derived using standard methodology and is based on the July 2005 IRIS RfD (1994 study) in which mice dosed with barium in drinking water for 2 years developed nephropathy.
- Cadmium: The previous MEG of 3.5 ppb was based on the 1994 IRIS RfD (0.001 mg/kg-day based on pre-1985 human studies). In March 1999, ATSDR developed a chronic MRL for cadmium of 0.0002 mg/kg-day based on a 1989 study of human renal damage in a cadmium-polluted area of Japan. The ATSDR chronic MRL was used to develop the 2010 MEG of 1 ppb.
- Chloramine: The previous MEG of 660 ppb was based on 20% of the DWEL (3300 ppb). The DWEL for this compound was increased to 3500 ppb in 2006. Therefore, the 2010 MEG has changed to 700 ppb (20% of the DWEL).
- Chromium (total): The previous MEG of 40 ppb was based on 20% of the DWEL (200 ppb). The DWEL for this compound was decreased to 100 ppb in 2006. Therefore, the 2010 MEG has changed to 20 ppb (20% of the DWEL).
- Chromium VI: The previous MEG (35 ppb) was based on the pre-1998 IRIS RfD of 5E-03 mg/kg-day. In September 1998, the IRIS RfD was revised to 3E-03 mg/kg-day, resulting in a 2010 MEG of 20 ppb.

- Copper: The previous MEG (1300 ppb) was based on the EPA MCGL (action level) of 1300 ppb. In 2004, ATSDR developed a chronic MRL for copper of 0.014 mg/kg-day based on a 2 month human drinking water study. A RSC of 100% was used in the development of the 2010 MEG of 500 ppb since the human subjects were exposed to copper from dietary as well as non-dietary (drinking water) sources (see MEG copper file for further discussion).
- Nickel (soluble salts): The previous MEG (140 ppb) was based on the 1996 IRIS RfD of 2E-02 mg/kg-day determined from a 1976 2-year feeding study in which rats displayed decreased body weights. In 1999, an International Toxicity Estimates for Risk (ITER) RfD of 8E-03 mg/kg-day was developed based on a 1994 study which demonstrated kidney effects in rats dosed for 6 months in drinking water. The RfD development combined three 3-fold uncertainty factors into one uncertainty factor of 10. Because three 3-fold uncertainty factors are roughly equivalent to a total factor of 30, an additional uncertainty factor of 3 was applied to the ITER RfD by ME-CDC. The resulting adjusted RfD of 3E-03 mg/kg-day was used to develop the 2010 MEG of 20 ppb.
- Selenium: The previous MEG (35 ppb) was based on the 1991 IRIS RfD of 5E-03 mg/kg-day determined from a 1989 human exposure study in China. In September 2003, ATSDR published a chronic MRL of 5E-03 mg/kg-day based on a 1994 study which was a follow-up study of the same population examined in the 1989 study. Though the IRIS RfD and ATSDR MRL are the same value, the ATSDR MRL is adopted for MEG development because it is based on more recent data than considered in the IRIS assessment. The ATSDR MRL results in a 2010 MEG of 40 ppb (rounded from 35 ppb).
- Thallium (chloride): The previous MEG (0.5 ppb) was based on the 1990 IRIS RfD. The exact calculated value, using the RfD of 8E-05 mg/kg-day, is 0.56 ppb which was rounded to 0.5 ppb to match the Lifetime Health Advisory available at that time. The IRIS RfD continues to be the value of choice to use in developing the MEG. However, the unrounded MEG value of 0.56 ppb will be rounded to 0.6 ppb in the 2010 update.
- Acetochlor: The previous MEG (14 ppb) was based on the 1993 IRIS RfD of 0.02 mg/kg-day. No oral slope factor was available for this compound at the time of the last MEG update though this compound was classified as a "likely" carcinogen. Therefore, a 10-fold uncertainty factor was applied to the RfD for potential carcinogenicity. In 2006, OPP developed an oral slope factor for acetochlor, which has been used as the basis of the 2010 MEG of 10 ppb.
- Acrylamide: The previous MEG (0.08 ppb) was based on the 1993 IRIS oral slope factor of 4.5 $(mg/kg\text{-}day)^{-1}$. In 2010, a new IRIS assessment was posted with a revised oral slope factor of 0.5 $(mg/kg\text{-}day)^{-1}$, resulting in a 2010 MEG of 0.7 ppb.
- Alachlor: The previous MEG (7 ppb) was based on the 1993 IRIS RfD with a 10-fold uncertainty factor applied because alachlor was classified as a B2 carcinogen lacking an oral slope factor. In 1997, CA-OEHHA developed an oral slope factor for this compound, which has been used as the basis of the 2010 MEG of 6 ppb.

- Atrazine: The previous MEG (3 ppb) was based on a 1993 OPP oral slope factor of 1.12E-01 $(mg/kg\text{-}day)^{-1}$. No documentation for this value could be located within OPP sources at the time of the toxicity review in 2010. In 2000, CA-OEHHA developed an oral slope factor for this compound of 2.3E-01 $(mg/kg\text{-}day)^{-1}$. Because CA-OEHHA is higher in the hierarchy than OPP, and documentation of the OPP value could not be located during the 2010 update, the CA-OEHHA oral slope factor has been used at the basis for the 2010 MEG of 2 ppb.
- Benzene: The previous MEG (6 ppb) was based on the 2000 IRIS oral slope factor. A MEG for benzene for non-cancer effects, based on the 2003 IRIS RfD (4E-03 mg/kg-day from a 1996 study), would have been 30 ppb. In August 2007, ATSDR completed a toxicity evaluation for benzene and developed a chronic MRL of 5E-04 mg/kg-day based on a 2004 study. The 2004 study was a follow-up of the 1996 study and examined immunological effects at lower doses. Due to the higher quality of the ATSDR MRL as compared to the IRIS RfD, the ATSDR MRL has been used as the basis for the 2010 MEG of 4 ppb.
- Bromochloromethane: The previous MEG of 10 ppb was based on 20% of the DWEL (50 ppb). The DWEL for this compound was increased to 500 ppb in 2006. Therefore, the 2010 MEG has changed to 100 ppb (20% of the DWEL).
- Captan: The previous MEG (146 ppb) was based on a 1993 OPP oral slope factor of 2.4E-03 $(mg/kg\text{-}day)^{-1}$. No documentation for this value could be located within OPP sources at the time of the toxicity review in 2010. In 2000, CA-OEHHA developed an oral slope factor for this compound of 2.3E-03 $(mg/kg\text{-}day)^{-1}$. Because CA-OEHHA is higher in the hierarchy than OPP, and documentation of the OPP value could not be located during the 2010 update, the CA-OEHHA oral slope factor has been used at the basis for the 2010 MEG of 200 ppb (rounded from 152 ppb).
- Carbon tetrachloride: The previous MEG (3 ppb) was based on the 1991 IRIS oral slope factor of 0.13 $(mg/kg\text{-}day)^{-1}$. In 2010, a new IRIS assessment was posted with a revised oral slope factor of 0.07 $(mg/kg\text{-}day)^{-1}$, resulting in a 2010 MEG of 5 ppb.
- Chlordane: The previous MEG (0.3 ppb) was based on the 1987 IRIS oral slope factor of 1.3 $(mg/kg\text{-}day)^{-1}$. In 1998, IRIS performed a re-evaluation of chlordane and revised the oral slope factor for this compound to 0.35 $(mg/kg\text{-}day)^{-1}$. The revised IRIS oral slope factor has been used at the basis for the 2010 MEG of 1 ppb.
- Chloromethane: The previous MEG (3 ppb) was stated as based on 20% of the DWEL (100 ppb) and then divided by 10 for potential carcinogenicity (no RfD has been developed for this compound since it primarily exists as a gas at ambient temperatures). IRIS previously classified this compound into carcinogen Group C due to an increased incidence of renal tumors only in male mice and only at the highest dose tested (1000 ppm). This evaluation was withdrawn from IRIS in 1997. The renal tumor response was re-evaluated along with other animal and human evidence by IRIS in 2001, resulting in the

classification of chloromethane into Group D. Therefore, the 2010 MEG of 20 ppb is based on 20% of the DWEL, which has remained at 100 ppb.

- Chlorothalonil: The previous MEG (45 ppb) was based on a 1993 OPP oral slope factor of 7.7E-03 $(mg/kg\text{-}day)^{-1}$. Documentation for this OPP oral slope factor could not be located during the 2010 update. A noncancer-based MEG for this compound, based on the IRIS RfD of 1.5E-02 mg/kg-day, is 100 ppb (the IRIS RfD has not changed). In 2000, CA-OEHHA developed an oral slope factor for this compound of 3.1E-03 $(mg/kg\text{-}day)^{-1}$. Use of the CA-OEHHA oral slope factor results in a cancer-based MEG which is slightly higher (113 ppb) than that based on the IRIS RfD. Therefore, the IRIS RfD has been used as the basis for the 2010 MEG of 100 ppb.
- 4-Chlorotoluene: The previous MEG (140 ppb) was based on 20% of the DWEL of 700 ppb. The DWEL for 4-chlorotoluene was set at the same value as 2-chlorotoluene, making the assumption that these two chlorotoluene isomers have identical toxicity. In May 2009, EPA published a preliminary peer-reviewed toxicity value (PPRTV) for 4-chlorotoluene of 7E-02 mg/kg-day (the IRIS RfD for 2-chlorotoluene is 2E-02 mg/kg-day). This preliminary RfD has been used as the basis for the 2010 MEG of 500 ppb.
- Diallate: The previous MEG (3.5 ppb) was based on a 1989 OPP RfD of 5E-03 mg/kg-day, divided by 10 to account for the potential carcinogenicity of this B2 carcinogen. The OPP RfD has since been withdrawn from the OPP database. No RfD has been developed for this compound by any other source. However, HEAST (1997) has a published oral slope factor of 6.1E-02 $(mg/kg\text{-}day)^{-1}$. Therefore, the 2010 MEG of 6 ppb is based on the HEAST oral slope factor as the only available toxicity value for this compound.
- Diazinon: The previous MEG (0.6 ppb) was based on a 1993 OPP RfD of 9E-05 mg/kg-day. In 2008, ATSDR developed a chronic MRL for this compound of 7E-04 mg/kg-day. The ATSDR MRL is based on a 98-month feeding study in rats where a NOAEL was identified for changes in RBC acetylcholinesterase activity. The ATSDR MRL has been used as the basis for the 2010 MEG of 5 ppb.
- 1,2-Dibromo-3-chloropropane: The previous MEG (0.25 ppb) was based on a HEAST oral slope factor of 1.4 $(mg/kg\text{-}day)^{-1}$. In May 2009, the EPA developed preliminary peer-reviewed toxicity values (PPRTV) for this compound, including a RfD (2E-04 mg/kg-day) and oral slope factor (0.8 $(mg/kg\text{-}day)^{-1}$). Use of the PPRTV values results in a cancer-based value of 0.4 ppb and a noncancer-based value of 1 ppb. Therefore, the PPRTV oral slope factor has been used as the basis for the 2010 MEG of 0.4 ppb.
- 1,3-Dichlorobenzene: The previous MEG (60 ppb) was based on 20% of the DWEL (3,000 ppb) and then divided by 10 for potential carcinogenicity based on structural similarity to the para-dichlorobenzene isomers which is classified as potentially carcinogenic (Class C). IRIS has classified this compound into Class D, therefore, no adjustment for potential carcinogenicity appears to be warranted. In 2006, ATSDR developed an intermediate MRL for 1,3-dichlorobenzene of 2E-02 based on a 90-day rat study. The intermediate MRL was decreased 100-fold through the use of a 10-fold subchronic-to-chronic

uncertainty factor and a 10-fold uncertainty factor for database deficiencies (as done for 1,2-dichlorobenzene for a lack of studies assessing reproductive effects) to determine a chronic MRL of 2E-04. This adjusted intermediate MRL has been used as the basis for the 2010 MEG of 1 ppb.

- 1,2-Dichlorobenzene: The previous MEG (63 ppb) was based on the 1991 IRIS RfD, which was divided by 10 for potential carcinogenicity based on structural similarity to the para-dichlorobenzene isomers which is classified as potentially carcinogenic (Class C). IRIS has classified this compound into Class D, therefore, no adjustment for potential carcinogenicity appears to be warranted. The IRIS RfD was developed through the application of a 10-fold uncertainty factor for database deficiencies related to the lack of studies assessing reproductive effects. In 2006, ATSDR developed a chronic MRL for this compound of 0.3 mg/kg-day. Because studies assessing reproductive effects continue to be lacking, a 10-fold uncertainty factor was applied to the ATSDR chronic MRL, resulting in an adjusted chronic MRL of 0.03 mg/kg-day. This adjusted chronic MRL has been used as the basis for the 2010 MEG of 200 ppb.
- 1,4-Dichlorobenzene: The previous MEG (21 ppb) was based on a HEAST RfD, which was divided by 10 for the potential carcinogenicity of this Class C carcinogen. In 2002, CA-OEHHA developed an oral slope factor for this compound of 5.4E-03 $(mg/kg\text{-}day)^{-1}$. The CA-OEHHA oral slope factor has been used as the basis for the 2010 MEG of 70 ppb.
- 1,1-Dichloroethane: The previous MEG (70 ppb) was based on a HEAST RfD, which was divided by 10 for the potential carcinogenicity of this Class C carcinogen. In 2002, CA-OEHHA developed an oral slope factor for this compound of 5.7E-03 $(mg/kg\text{-}day)^{-1}$. The CA-OEHHA oral slope factor has been used as the basis for the 2010 MEG of 60 ppb.
- 1,1-Dichloroethene: The previous MEG (0.6 ppb) was based on the 1987 IRIS oral slope factor which was subsequently withdrawn from IRIS in 2002 along with the Class C designation for this compound. The 1987 oral slope factor was based on a non-statistically significant increase in adrenal tumors in male rats. Because the tumor incidences were not statistically significant in any studies, EPA withdrew their previous oral slope factor and cancer classification for this compound. The 2002 IRIS RfD of 5E-02 mg/kg-day continues to be current and results in a noncancer-based MEG of 40 ppb, which is used as the 2010 MEG.
- 1,2-Dichloropropane: The previous MEG (5 ppb) was based on a HEAST oral slope factor of 6.8E-02 $(mg/kg\text{-}day)^{-1}$. In 2000, CA-OEHHA developed an oral cancer slope factor for this compound of 3.6E-03 $(mg/kg\text{-}day)^{-1}$. The CA-OEHHA oral slope factor has been used as the basis for the 2010 MEG of 10 ppb.
- Diethylphthalate: The previous MEG (5,000 ppb) was based on the 1993 IRIS RfD. The exact calculated value, using the RfD of 0.8 mg/kg-day, is 5,600 ppb which was rounded to 5,000 ppb to match the Lifetime Health Advisory available at that time. The IRIS RfD continues to be the value of choice to use in developing the MEG. However, the unrounded MEG value of 5,600 ppb

will be rounded to 6,000 ppb in the 2010 update. There is no longer a Lifetime Health Advisory value listed by EPA, as of 2006.

- Diisopropyl methylphosphonate: The previous MEG (500 ppb) was based on the 1993 IRIS RfD. The exact calculated value, using the RfD of 0.08 mg/kg-day, is 560 ppb which was rounded to 500 ppb. The IRIS RfD continues to be the value of choice to use in developing the MEG. However, the unrounded MEG value of 560 ppb will be rounded to 600 ppb in the 2010 update.
- 2,4-Dinitrotoluene: The previous MEG (0.5 ppb) was based on the 1990 IRIS oral slope factor of 6.8E-01 $(mg/kg\text{-}day)^{-1}$ for dinitrotoluene mixtures. In 2009, CA-OEHHA developed an oral cancer slope factor specific for this compound of 3.1E-01 $(mg/kg\text{-}day)^{-1}$. The CA-OEHHA oral slope factor has been used as the basis for the 2010 MEG of 1 ppb.
- Ethylbenzene: The previous MEG (70 ppb) was based on the 1991 IRIS RfD, which was divided by 10 for the potential carcinogenicity of this compound that has been classified by EPA as a "likely" carcinogen. In 2007, CA-OEHHA developed an oral slope factor for this compound of 1.1E-02 $(mg/kg\text{-}day)^{-1}$. The CA-OEHHA oral slope factor has been used as the basis for the 2010 MEG of 30 ppb.
- Ethylene glycol monobutyl ether: The previous MEG (3,500 ppb) was based on the 1999 IRIS RfD of 0.5 mg/kg-day. The resulting value was not divided by 10 even though this compound was classified by EPA into Class C. An updated IRIS assessment was published in 2010 indicating that this compound is unlikely to be carcinogenic to humans and providing a revised RfD of 0.1 mg/kg-day based on a chronic rat study. This updated IRIS RfD was used to develop a 2010 MEG of 700 ppb.
- Heptachlor: The previous MEG (0.08 ppb) was based on the IRIS oral slope factor which continues to be the best available cancer toxicity value. In 2007, ATSDR developed an intermediate MRL for heptachlor of 1E-04 based on a 2001 neurobehavioral/developmental study in rats of 50 days duration. The intermediate MRL was decreased 10-fold through the use of a subchronic-to-chronic uncertainty factor to determine a chronic MRL of 1E-05. This adjustment was deemed to be necessary due to the potential for this compound to accumulate in fatty tissue and result in increasing body burdens with duration of exposure. This adjusted intermediate MRL has been used as the basis for the 2010 MEG of 0.07 ppb, as it is slightly lower than the cancer-based value of 0.08 ppb.
- gamma-Hexachlorocyclohexane (Lindane): The previous MEG (0.2 ppb) was based on the 1988 IRIS RfD of 3E-04 mg/kg-day. When the RfD was divided by 10 to account for the potential carcinogenicity of this compound, the resultant noncancer-based value was slightly less than the cancer-based value (0.3 ppb). The noncancer-based value divided by 10 was used as the MEG. In 2005, ATSDR developed an intermediate MRL for Lindane of 1E-05 based on a 1992 immunotoxicology study in rats of 24 weeks duration. The intermediate MRL was decreased 3-fold through the use of a subchronic-to-chronic uncertainty factor to determine a chronic MRL of 4E-06. This adjustment was deemed to be necessary due to the potential for this compound

to accumulate in fatty tissue and result in increasing body burdens with duration of exposure. This adjusted intermediate MRL has been used as the basis for the 2010 MEG of 0.03 ppb, as it is lower than the cancer-based value.

- Nitrobenzene: The previous MEG (3.5 ppb) was based on the 1993 IRIS RfD of 5E-04 mg/kg-day. In 2009, IRIS updated the nitrobenzene assessment and revised the RfD to 2E-03 mg/kg-day. At that time, the carcinogenicity assessment was also updated with nitrobenzene being classified as a "likely" carcinogen, though no oral slope factor was developed. Therefore, the 2010 MEG of 1 ppb is based on the 2009 IRIS RfD adjusted 10-fold for potential carcinogenicity.
- Parathion: The previous MEG (0.2 ppb) was based on a 1988 OPP RfD of 3.3E-04 mg/kg-day, divided by 10 to account for the potential carcinogenicity of this Class C carcinogen. The OPP RfD has since been withdrawn from the OPP database. However, HEAST has a published an RfD of 6E-03 mg/kg-day. Therefore, the 2010 MEG of 4 ppb is based on the HEAST RfD as the only available toxicity value for this compound, divided by an uncertainty factor of 10 for potential carcinogenicity.
- Phorate: The previous MEG (3.5 ppb) was based on a 1988 OPP RfD of 5E-04 mg/kg-day. The OPP RfD has since been withdrawn from the OPP database. However, HEAST has a published an RfD of 2E-04 mg/kg-day. Therefore, the 2010 MEG of 1 ppb is based on the HEAST RfD as the only available toxicity value for this compound.
- Pronamide: The previous MEG (23 ppb) was based on a 1988 OPP oral slope factor of 1.5E-02 $(mg/kg\text{-}day)^{-1}$. In 2002, OPP revised their cancer assessment for this compound and provided a revised slope factor of 2.6E-02 $(mg/kg\text{-}day)^{-1}$. Use of this revised oral slope factor results in a 2010 MEG of 10 ppb.
- Propazine: The previous MEG (14 ppb) was based on the 1990 IRIS RfD of 2E-02 mg/kg-day. Because this compound is classified into carcinogen Class C by OPP, the RfD was divided by 10 to account for the potential carcinogenicity of this compound which resulted in a noncancer-based value (14 ppb) that was slightly greater than the cancer-based value (7.9 ppb) using the OPP oral slope factor. The noncancer-based value divided by 10 was used as the MEG. In 2006, OPP re-evaluated the potential carcinogenicity of this compound and concluded that it was "not likely" to be a carcinogen and withdrew the previous OPP oral slope factor. Because the IRIS RfD has not changed, the IRIS RfD has been used as the basis for the 2010 MEG of 100 ppb.
- Terbufos: The previous MEG (0.35 ppb) was based on a 1996 OPP RfD of 5E-05 mg/kg-day. Subsequently, HEAST has a published an RfD of 2.5E-05 mg/kg-day. Therefore, the 2010 MEG of 0.2 ppb is based on the HEAST RfD.
- 2,3,7,8-Tetrachlorodibenzo-p-dioxin: The previous MEG (7E-06 ppb) was based on a RfD developed by the BOH circa 1998. The non-cancer based value was lower than the cancer-based value (2.5E-05 ppb), based on an oral slope factor also developed by the BOH. In 2005, CA-OEHHA developed an oral slope factor for this compound. The CA-OEHHA oral slope factor has been used as the basis for the 2010 MEG of 3E-06 ppb.

- Tetrachloroethylene: The previous MEG (7 ppb) was based on the 1988 IRIS RfD of 1E-02 mg/kg-day, divided by 10 to account for the potential carcinogenicity of this compound. In 2005, CA-OEHHA developed an oral slope factor for this compound. The CA-OEHHA oral slope factor has been used as the basis for the 2010 MEG of 0.6 ppb.
- Toluene: The previous MEG (1,400 ppb) was based on the 1994 IRIS RfD of 2E-01 mg/kg-day. In 2005, IRIS revised their assessment for toluene and published a revised RfD of 8E-02 mg/kg-day. The 2005 IRIS RfD has been used as the basis for the 2010 MEG of 600 ppb.
- 1,1,1-Trichloroethane: The previous MEG (200 ppb) was based on the EPA Health Advisory, available at the time as this compound was undergoing evaluation by EPA. In 2007, IRIS published their assessment for 1,1,1-trichloroethane and published an RfD of 2E+00 mg/kg-day. The 2005 IRIS RfD has been used as the basis for the 2010 MEG of 10,000 ppb.
- Trichloroethylene: The previous MEG (32 ppb) was based on the now-withdrawn HEAST oral slope factor of 1.1E-02 $(mg/kg\text{-}day)^{-1}$. In 2005, CA-OEHHA developed an oral slope factor for this compound of 1.3E-02 $(mg/kg\text{-}day)^{-1}$. The CA-OEHHA oral slope factor has been used as the basis for the 2010 MEG of 30 ppb.
- 2,4,6-Trichlorophenol: The previous MEG (32 ppb) was based on the 1994 IRIS oral slope factor of 1.1E-02 $(mg/kg\text{-}day)^{-1}$. This IRIS slope factor continues to be current. In 2007, EPA developed a PPRTV RfD for this compound of 1E-03 mg/kg-day. The noncancer-based MEG (7 ppb) is lower than a cancer-based MEG. Therefore, the lower noncancer-based value of 7 ppb has been selected as the 2010 MEG.
- 2,4,5-Trichlorophenoxyproprionic acid: The previous MEG (50 ppb) was based on the 1988 IRIS RfD. The exact calculated value, using the RfD of 8E-03 mg/kg-day, is 56 ppb which was rounded to 50 ppb to match the Lifetime Health Advisory available at that time. The IRIS RfD continues to be the value of choice to use in developing the MEG. However, the Health Advisory value was withdrawn in 2006. Therefore, the unrounded MEG value of 56 ppb will be rounded to 60 ppb in the 2010 update.
- Ziram/Ferbam: Due to a lack of toxicity values for this compound, the 1992 MEG for this compound (25 ppb) continued to be used. In 2003, OPP developed a RfD for this compound of 5E-03 mg/kg-day. The OPP evaluation also concluded that there was "suggestive evidence" that this compound is a carcinogen. Therefore, this OPP RfD, divided by 10 for potential carcinogenicity, has been used as the basis for the 2010 MEG of 4 ppb.

<u>Compounds Deleted from the MEG List</u>

Three pesticides (Acifluorofen, Butachlor and Dimethrin) were removed from the MEG list due to a lack of available toxicity information.

Addition of Compounds to MEG List

Due to the development of leaching to groundwater soil standards by Maine DEP for a number of compounds that lacked MEGs, Maine DEP requested MEGs for these compounds such that a target soil concentration protective of groundwater used as a source of drinking water could be developed. The MEG serves as the groundwater target (i.e., acceptable level in groundwater) for the leaching modeling. The following provides a table of compounds that have been added to the MEG list for this reason, as well as the toxicity basis for each of the MEGs:

Beryllium	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Chromium III	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Cobalt	BOH risk based, USEPA 1990 Protocol, PPRTV RfD
Iron	BOH risk based, USEPA 1990 Protocol, PPRTV RfD
Vanadium	BOH risk based, USEPA 1990 Protocol, HEAST RfD
Acenaphthene	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Acrolein	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Allyl chloride	BOH risk based, USEPA 1990 Protocol, CA-OEHHA CPF, 10E-5 ILCR
Anthracene	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Benzo(a)anthracene	BOH risk based, USEPA 1990 Protocol, IRIS CPF for benzo(a)pyrene with EPA 1993 RPF, 10E-5 ILCR
Benzo(b)fluoranthene	BOH risk based, USEPA 1990 Protocol, IRIS CPF for benzo(a)pyrene with EPA 1993 RPF, 10E-5 ILCR
Benzo(k)fluoranthene	BOH risk based, USEPA 1990 Protocol, IRIS CPF for benzo(a)pyrene with EPA 1993 RPF, 10E-5 ILCR
Benzyl chloride	BOH risk based, USEPA 1990 Protocol, IRIS CPF, 10E-5 ILCR
Biphenyl (1,1-)	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Butadiene (1,3-)	BOH risk based, USEPA 1990 Protocol, CA-OEHHA CPF, 10E-5 ILCR
Butyl benzyl phthalate	BOH risk based, USEPA 1990 Protocol, PPRTV CPF, 10E-5 ILCR
Chloroaniline (4-)	BOH risk based, USEPA 1990 Protocol, PPRTV CPF, 10E-5 ILCR
Chlorobenzene	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Chrysene	BOH risk based, USEPA 1990 Protocol, IRIS CPF for benzo(a)pyrene with EPA 1993 RPF, 10E-5 ILCR
DDD	BOH risk based, USEPA 1990 Protocol, IRIS CPF, 10E-5 ILCR
DDE	BOH risk based, USEPA 1990 Protocol, IRIS CPF, 10E-5 ILCR
Dibenz(a,h)anthracene	BOH risk based, USEPA 1990 Protocol, IRIS CPF for benzo(a)pyrene with EPA 1993 RPF, 10E-5 ILCR
Dichlorobenzidine (3,3-)	BOH risk based, USEPA 1990 Protocol, IRIS CPF, 1E-05 ILCR.

Dichloropropane (1,3-)	BOH risk based, USEPA 1990 Protocol, PPRTV RfD
Dimethylphenol (2,4-)	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Dimethylphenol (2,6-)	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Dinitrobenzene (1,2-)	BOH risk based, USEPA 1990 Protocol, PPRTV RfD
Dinitrobenzene (1,4-)	BOH risk based, USEPA 1990 Protocol, PPRTV RfD
Ethyl chloride	BOH risk based, USEPA 1990 Protocol, PPRTV RfD, 10x UF for C carcinogen
Fluoranthene	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Fluorene	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Hexachlorocyclohexane (alpha-)	BOH risk based, USEPA 1990 Protocol, IRIS CPF, 10E-5 ILCR
Hexachlorocyclohexane (beta-)	BOH risk based, USEPA 1990 Protocol, IRIS CPF, 10E-5 ILCR
Indeno(1,2,3-cd)pyrene	BOH risk based, USEPA 1990 Protocol, IRIS CPF for benzo(a)pyrene with EPA 1993 RPF, 10E-5 ILCR
Methanol	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Methyl isobutyl ketone	BOH risk based, USEPA 1990 Protocol, HEAST RfD
Methylnaphthalene (2-)	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Methylphenol (2-)	BOH risk based, USEPA 1990 Protocol, IRIS RfD, 10x UF for Class C carcinogen
Propylene glycol	BOH risk based, USEPA 1990 Protocol, PPRTV RfD
Pyrene	BOH risk based, USEPA 1990 Protocol, IRIS RfD
2,4,5-Trichlorophenol	BOH risk based, USEPA 1990 Protocol, IRIS RfD
Vinyl acetate	BOH risk based, USEPA 1990 Protocol, HEAST RfD

In addition, Maine DEP has transitioned to a risk-based petroleum hydrocarbon fractionation approach and away from using Gasoline Range Organic (GRO) and Diesel Range Organic (DRO) analysis to evaluate petroleum sites. The risk-based petroleum hydrocarbon fractionation approach is based on the Massachusetts Department of Environmental Protection toxicity values for the petroleum hydrocarbon fractions. These toxicity values were used to develop MEGs for the following petroleum hydrocarbon fractions:

Petroleum Hydrocarbon Fraction	Toxicity Basis for MEG
C5-C8 Aliphatics	MassDEP RfD; surrogate n-hexane
C9-C12 Aliphatics	MassDEP RfD; surrogate C9-C17 aliphatic mixture
C9-C18 Aliphatics	MassDEP RfD; surrogate C9-C17 aliphatic mixture
C19-C36 Aliphatics	MassDEP RfD; surrogate C15-C45 aliphatic mixtures
C9-C10 Aromtics	MassDEP RfD; surrogate pyrene
C11-C22 Aromatics	MassDEP RfD; surrogate pyrene

Changes to MEGs - 2008 vs. 2010

		2008 MEGs				2010 MEGs			
Chemical	**CASRN**	**MEG Status**	**MEG (ppb)**	**Toxicity Endpoint**	**Basis for MEG**	**MEG Status**	**MEG (ppb)**	**Toxicity Endpoint**	**Basis for MEG**
Aluminum	7429-90-5	interim	1430	NC	BOH, 1984	interim	7000	NC	ATSDR chronic MRL
Barium	7440-39-3	final	2000	NC	1998 IRIS RfD	final	1000	NC	2005 IRIS RfD
Cadmium	7440-43-9	final	3.5	NC	1994 IRIS RfD	interim	1	NC	1999 ATSDR chronic MRL
Chloramine	10599-90-3	interim	660	NC	20% of DWEL (2000)	interim	700	NC	20% of DWEL (2006)
Chromium (total)	7440-47-3	interim	40	NC	20% of DWEL (2000)	interim	20	NC	20% of DWEL (2006)
Chromium VI	18540-29-9	final	35	NC	1988 IRIS RfD	final	20	NC	1998 IRIS RfD
Copper	7440-50-8	final	1300	NC	EPA MCGL	interim	500	NC	2004 ATSDR chronic MRL
Nickel (soluble salts)	7440-02-0	final	140	NC	1996 IRIS RfD	interim	20	NC	1999 adjusted ITER RfD
Selenium	7782-49-2	final	35	NC	1991 IRIS RfD	interim	40	NC	2003 ATSDR chronic MRL
Thallium (chloride)	7791-12-0	final	0.5	NC	1990 IRIS RfD/EPA HA	final	0.6	NC	1990 IRIS RfD
Acetochlor	34256-82-1	interim	14	NC	1993 IRIS RfD/10	interim	10	C	2006 OPP CPF
Acrylamide	79-06-1	final	0.08	C	1993 IRIS CPF	final	0.7	C	2010 IRIS CPF
Alachlor	15972-60-8	final	7	NC	1993 IRIS RfD/10	interim	6	C	1997 CA-OEHHA CPF
Atrazine	1912-24-9	interim	3	C	1993 OPP CPF	interim	2	C	2000 CA-OEHHA CPF
Benzene	71-43-2	final	6	C	2000 IRIS CPF	interim	4	NC	2007 ATSDR chronic MRL
Bromochloromethane	74-97-5	interim	10	NC	20% of DWEL (2000)	interim	100	NC	20% of DWEL (2006)
Captan	133-06-2	interim	146	C	1993 OPP CPF	interim	200	C	2000 CA-OEHHA CPF
Carbon tetrachloride	56-23-5	final	3	C	1991 IRIS CPF	final	5	C	2010 IRIS CPF
Chlordane	12789-03-6	final	0.3	C	1987 IRIS CPF	final	1	C	1998 IRIS CPF
Chloromethane	74-87-3	interim	3	NC	20% of DWEL (2000)/10	interim	20	NC	20% of DWEL (2006)
Chlorothalonil	1897-45-6	interim	45	C	1993 OPP CPF	final	100	NC	1988 IRIS RfD
Chlorotoluene (4- or para-)	106-43-4	interim	140	NC	20% of DWEL (2000)	interim	500	NC	2009 PPRTV RfD
Diallate (Avadex)	2303-16-4	interim	3.5	NC	1989 OPP RfD/10	interim	6	C	1997 HEAST CPF
Diazinon	333-41-5	interim	0.6	NC	1993 OPP RfD	interim	5	NC	2008 ATSDR chronic MRL
Dibromo-3-chloropropane (1,2-) (DBCP)	96-12-8	interim	0.25	C	1997 HEAST CPF	interim	0.4	C	2009 PPRTV CPF
Dichlorobenzene (1,3- or meta)	541-73-1	interim	60	NC	20% of DWEL (3000)/10	interim	1	NC	2006 adjusted ATSDR intermediate MRL
Dichlorobenzene (1,2- or ortho)	95-50-1	interim	63	NC	1991 IRIS RfD/10	interim	200	NC	2006 adjusted ATSDR chronic MRL
Dichlorobenzene (1,4- or para-)	106-46-7	interim	21	NC	1997 HEAST RfD/10	interim	70	C	2002 CA-OEHHA CPF
Dichloroethane (1,1-)	75-34-3	interim	70	NC	1997 HEAST RfD/10	interim	60	NC	2002 CA-OEHHA CPF
Dichloroethylene (1,1-)	75-35-4	final	0.6	C	1987 IRIS CPF	final	40	NC	2002 IRIS RfD
Dichloropropane (1,2-)	78-87-5	interim	5	C	1997 HEAST CPF	interim	10	C	2000 CA-OEHHA CPF
Diethyl phthalate (PAE)	84-66-2	final	5000	NC	1993 IRIS RfD/EPA HA	final	6000	NC	1993 IRIS RfD
Diisopropyl methylphosphonate	1445-75-6	final	500	NC	1993 IRIS RfD (incorrectly rounded)	final	600	NC	1993 IRIS RfD (correctly rounded)
Dinitrotoluene (2,4-)	121-14-2	final	0.5	C	1990 IRIS CPF	interim	1	C	2009 CA-OEHHA CPF
Ethylbenzene	100-41-4	interim	70	NC	1999 IRIS RfD/10	interim	30	C	2007 CA-OEHHA CPF
Ethylene glycol monobutyl ether	111-76-2	final	3500	NC	1999 IRIS RFD	final	700	NC	2010 IRIS RfD
Heptachlor	76-44-8	final	0.08	NC	1993 IRIS CPF	interim	0.07	NC	2007 adjusted ATSDR intermediate MRL
Hexachlorocyclohexane (gamma-) (Lindane)	58-89-9	final	0.2	NC	1988 IRIS RfD/10	interim	0.03	NC	2005 adjusted ATSDR intermediate MRL
Nitrobenzene	98-95-3	final	3.5	NC	1993 IRIS RfD	interim	1	NC	2009 IRIS RfD/10
Parathion	56-38-2	final	0.2	NC	1988 OPP RfD/10	interim	4	NC	1997 HEAST RfD/10
Phorate	298-02-2	interim	3.5	NC	1988 OPP RFD	interim	1	NC	1997 HEAST RfD
Pronamide	23950-58-5	interim	23	C	1988 OPP CPF	interim	10	C	2002 OPP CPF
Propazine	139-40-2	final	14	NC	1990 IRIS RfD/10	final	100	NC	1990 IRIS RfD
Terbufos	13071-79-9	interim	0.35	NC	1996 OPP RfD	interim	0.2	NC	1997 HEAST RfD
Tetrachlorodibenzo-p-dioxin (2,3,7,8-)	1746-01-6	final	7E-06	NC	BOH 1998	interim	3E-06	C	2005 CA-OEHHA CPF
Tetrachloroethylene	127-18-4	final	7	NC	1988 IRIS RfD/10	interim	0.6	C	2005 CA-OEHHA CPF
Toluene	108-88-3	final	1400	NC	1994 IRIS RfD	final	600	NC	2005 IRIS RfD
Trichloroethane (1,1,1-)	71-55-6	interim	200	NC	EPA HA (2000)	final	10000	NC	2007 IRIS RfD
Trichloroethylene	79-01-6	interim	32	C	1996 HEAST CPF	interim	30	C	2005 CA-OEHHA CPF
Trichlorophenol (2,4,6-)	88-06-2	final	32	C	1994 IRIS CPF	interim	7	NC	2007 PPRTV RfD
Trichlorophenoxypropionic acid (2,4,5-)	93-72-1	final	50	NC	1988 IRIS RfD/EPA HA	final	60	NC	1988 IRIS RfD
Ziram / Ferbam	137-30-4	interim	25	NC	1992 MEG	interim	4	NC	2003 OPP RfD/10

Key to Abbreviations:
MEG = Maximum Exposure Guideline
PPRTV - Preliminary Peer-reviewed Toxicity Values developed by EPA Superfind Technical Support Center
ATSDR = Agency for Toxic Substance and Disease Registry
C = Carcinogenic Efffects
CA-OEHHA = California Office of Environmental Health Hazard Assessment
RfD = reference dose
CASRN = Chemical Abstracts System Registration Number
IRIS = USEPA Integrated Risk Information System
CPF = cancer potency factor
NC = Noncarcinogenic Effects
HEAST = Health Affects Assessment Summary Tables
MRL = Minimal Risk Level